



# Exhibit 4.2

**JBL Professional - Harman – column loudspeaker array with beam shaping for adjustable coverage**  
 (See Accused Product List at end of chart for models)

**Infringement of the '430 patent**

Claim #3	Evidence
<p>3. A speaker system for producing localized regions of sound comprising:</p>	<p>The JBL Professional - Harman column loudspeaker array is speaker a system for producing localized regions of sound.</p> <p>For example, the column loudspeaker array produces an acoustic beam of sound. The beam can be aimed at the listening audience while keeping it away from other surfaces (e.g. ceiling and walls) that may cause echoes and reverberation.</p>  <p><u>The biggest challenge facing a sound system designer is devising a system which will have a high direct to reverberant sound ratio, maximizing the sound that arrives directly to the listeners ear, while reducing the sound energy from walls, ceilings and other acoustically reflective surfaces.</u> Intellivox products make it possible to control the vertical directivity pattern and aim the sound where you want it - at the listener. Going a step beyond today's standard beam steering, JBL's DDS (Digital Directivity Synthesis) technology allows for full control of near field and far field coverage creating an asymmetric vertical beam contoured specifically to your application.</p> <p>[2]</p>

	<p><b>Features</b> </p> <ul style="list-style-type: none"> <li>• Superb Speech Intelligibility</li> <li>• Slim Unobtrusive Design</li> <li>• Extended Frequency Response</li> <li>• Wide Horizontal Dispersion</li> <li>• <u>Vertical Beam Shaping (DDS Technology)</u></li> <li>• 32-bit floating point DSP</li> <li>• <u>Control of Vertical Beam Shaping</u></li> <li>• Dual Line Inputs</li> <li>• Volume Control</li> <li>• Delay (up to 20 seconds)</li> <li>• 8 band parametric EQ</li> <li>• 8 user definable, password protected presets on board (recallable through third party control devices)</li> <li>• AVC (Automatic Volume Control) via build-in ambient mic.</li> <li>• Upgradeable firmware</li> <li>• Network Ready</li> <li>• Integral Surveillance</li> <li>• Simulation via DDA, Catt-Acoustic, Odeon and EASE4.3</li> </ul>
a multiplicity of audio frequency speakers;	<p>The JBL Professional - Harman column loudspeaker array includes a multiplicity of audio frequency speakers.</p> <p>For example, column loudspeaker array has an array of seventeen individual 4" audio loudspeakers mounted along the axial direction of the loudspeaker.</p> <p><b><u>Active Beam Shaping, Self Powered, Loudspeaker Array</u></b></p> <p>The Intellivox-DS430 is the second tallest of Duran Audio's fully integrated digitally controlled loudspeaker arrays. A single Intellivox-DS430 is capable of covering an area of up to 50 m while maintaining an even sound pressure level. Its array length not only offers long throw capability but also extended control at lower frequencies, making it ideally suited to highly reverberant environments. <u>The seventeen, custom designed, 4" loudspeakers</u> are driven by a sixteen channel class-D amplifier, powered by a sophisticated switched mode power supply, all of which combine to ensure years of reliable operation. The loudspeakers themselves are arranged in accordance with our patented algorithm.</p> <p>[1]</p>
at least one defined sound target	The JBL Professional - Harman column loudspeaker array has at

spaced from each of the speakers of the multiplicity of speakers, wherein each speaker has a means for applying a time varying audio drive voltage which is substantially identical, except that each audio drive voltage is offset in time by an amount which is related to the distance between each speaker and the defined sound target, so that substantially identical sound from each speaker reaches the sound target at the same time; and

least one defined sound target spaced from each of the speakers of the multiplicity of speakers. Each speaker has a means for applying a time varying audio drive voltage which is substantially identical, except that each audio drive voltage is offset in time by an amount which is related to the distance between each speaker and the defined sound target. So that substantially identical sound from each speaker reaches the sound target at the same time.

For example, each of the speakers is connected to an audio amplifier. An audio signal is provided to each speaker via the speaker's respective amplifier. The audio signal is delayed more for speakers closer to the position at which the acoustic beam is aimed and delayed less for speakers farther from that position.




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[2]

According to the specification the term: "substantially identical" means:

"It should be understood that when, a means for applying a time

	<p>varying audio drive voltage, i.e. the signal used to drive individual speakers is described as substantially identical, the signals are defined as being substantially identical, although they vary in amplitude. The term, substantially identical, means capable of constructive interference when used in the sound system <b>36</b> of this invention.” [col.12 lines 18-24]</p>
<p>wherein the means for applying a time varying audio drive voltage includes a class D amplifier.</p>	<p>The means for applying a time varying audio drive voltage includes a class D amplifier.</p> <p>For example, a sixteen-channel class-D audio amplifier is used to drive the loudspeakers in the array.</p> <p><b>Active Beam Shaping, Self Powered, Loudspeaker Array</b> </p> <p>The Intellivox-DS430 is the second tallest of Duran Audio's fully integrated digitally controlled loudspeaker arrays. A single Intellivox-DS430 is capable of covering an area of up to 50 m while maintaining an even sound pressure level. Its array length not only offers long throw capability but also extended control at lower frequencies, making it ideally suited to highly reverberant environments. <u>The seventeen, custom designed, 4" loudspeakers are driven by a sixteen channel class-D amplifier, powered by a sophisticated switched mode power supply, all of which combine to ensure years of reliable operation. The loudspeakers themselves are arranged in accordance with our patented algorithm.</u></p> <p>[1]</p>

### Accused Product List

Intellivox Loudspeaker Array series: DS115, DS180, DSX180, DS280, DSX280 HD, DS380, DSX380 HD, DS430, DSX430, DS500, DSX500, HP-DS170, HP-DS370

### References

[1] JBL Professional – DS430  
<https://jblpro.com/en/products/intellivox-ds430>

[2] JBL Professional – Intellivox Speakers – Powered Adjustable-Coverage Columns  
[https://jblpro.com/en/product\\_families/intellivox-powered-adjustable-coverage-columns](https://jblpro.com/en/product_families/intellivox-powered-adjustable-coverage-columns)

[3] JBL Intellivox Beyond Beam Steering

<https://jblpro.com/resource/jbl-intellivox-beyond-beam-steering.pdf>

### **General References**

[A] Fohhn – Beam Steering Technology

<https://www.fohnn.com/en/technologies/fohnn-beam-steering-technology/>

[B] Digital Smart Homes – YSP Sound Projector

[http://www.digitalsmarthomes.com/products/yamahaysp/digital\\_sound\\_projector.html](http://www.digitalsmarthomes.com/products/yamahaysp/digital_sound_projector.html)

[C] ResearchGate - Audio Beam Steering With Phased Array Method Using Arduino Due Microcontroller

[https://www.researchgate.net/profile/Muhammad-Rivai/publication/324956381\\_Audio\\_beam\\_steering\\_with\\_phased\\_array\\_method\\_using\\_Arduino\\_Due\\_Microcontroller/links/5b0296594585154aeb069455/Audio-beam-steering-with-phased-array-method-using-Arduino-Due-Microcontroller.pdf](https://www.researchgate.net/profile/Muhammad-Rivai/publication/324956381_Audio_beam_steering_with_phased_array_method_using_Arduino_Due_Microcontroller/links/5b0296594585154aeb069455/Audio-beam-steering-with-phased-array-method-using-Arduino-Due-Microcontroller.pdf)